

Listing of the Claims:

1. (Currently Amended) A system for interacting with displays and all devices that use such displays comprised of

- a. a display,
- b. a ~~sensor or camera~~ a pointing object,
- c. ~~a pointing device remote from the sensor or a camera and that has in its field of view at least one of the following: (i) the pointing object only, or (ii) the display and the pointing object, or (iii) the display and the reflection or effect that the pointing object can produce on the display, can be viewed by the sensor or camera, wherein the sensor or camera operates independently from the pointing device;~~
- d. a method for detecting the position of the pointing device, object or its reflection or effect on the display in the image registered by the camera, and
- e. a method for establishing the mapping between the position of ~~the pointing device object or its reflection or effect on the display in the image registered by the camera~~ and a corresponding location on the display.

2. (Currently Amended) A system according to as defined by claim 1 ~~wherein the sensor or camera, in addition to viewing the image of the pointing object, can also view at least one of (i) the image of the display, (ii) the reflection or effect that the pointing device can produce on the display and (iii) space around the pointing device which commands the positioning of a pointing icon on the display.~~

3. (Currently Amended) A system as defined by claim 1 which commands the positioning of a pointing icon on input of data into the device using the display.

4. (Currently Amended) A system according to claim 1 wherein the pointing device object is a part of the human body of a user of the system such as at the hand or at the finger of the user, or an ornament or an object or device worn on the human body of the user, such as a glove or thimble and wherein the sensor or camera is remote from the human body pointing object.

5. (Currently Amended) A system according to claim 4 wherein the pointing device object is used to point to regions of the display by way of changing its position, attitude, or presentation.

6. (Currently Amended) A system according to claim 1 wherein the pointing device object is used to select, highlight, or define a particular point or region on the display.

7. (Currently Amended) A system according to claim 1 wherein the pointing device object is used to define a vector on the plane of the display that indicates a direction and magnitude relative to or with respect to an item on the display or a region of the display.

8. (Currently Amended) A system according to claim 3 2 wherein the pointing icon on the display can be registered by the sensor or camera.

9. (Currently Amended) A system according to claim 8 which also includes a method for correcting the offsets between (i) the position of the pointing device object, or reflection, or effect thereof on the display as observed by the user or by the sensor or camera, and (ii) the position of the pointer icon on the display.

10. (Original) A system as defined by claim 1 which also includes at least one of the following:

- a. a method for selecting or highlighting a specific item or icon on the display,
- b. a method for activating a specific process, program, or menu item represented on the display, and
- c. a method for writing, scribing, drawing, highlighting, annotating, or otherwise producing marks on the display.

11. (Currently Amended) A method for detecting a pointing device position of the pointing object or its reflection or effect on the display in the image registered by a camera comprising the steps of:

- a. defining at least one characteristic of the pointing object or its reflection or effect on the display that (i) is registered in the image captured by the camera and (ii) distinguishes the pointing object from other objects registered in the image from the camera.
 - ab. retrieving of ~~data or the~~ image from ~~a sensor or the~~ camera, wherein the pointing device is remote from the ~~sensor or camera~~, and
 - bc. analyzing the ~~data or~~ image from the ~~sensor or~~ camera to locate the characteristic or characteristics of the pointing device object in ~~the data~~, or locating at least a set of the picture elements in the image that comprise the rendition of the its reflection or effect on the display pointing device object.[.]
- d. determining the most likely position of the pointing object or its reflection or effect on the display in the image from the camera based on at least one of the following:
 - (i) the last known position of the pointing object or its reflection or effect on the display in the image.
 - (ii) the position or positions at which the at least one distinguishing characteristic of the pointing object, or its reflection or effect on the display or the set of the picture elements in the image that comprise the rendition of the pointing object, or its reflection or effect on the display.

12. (Currently Amended) A method according to claim 11 wherein ~~characteristics at least one characteristic that distinguish distinguishes the pointing device object from other objects in the data image from the sensor or the image from the camera are is~~ known a priori.

13. (Currently Amended) A method according to claim 11 wherein ~~characteristics at least one characteristic that distinguish distinguishes the pointing device object from other objects in the data from the sensor or the image from the camera are determined based on analysis of at least one set of the data acquired from the sensor or one image acquired from the camera.~~

14. (Currently Amended) A method according to claim 13 wherein ~~the characteristics at least one characteristic that distinguish distinguishes the pointing device object from other objects, whose rendition are present in the data from the sensor or in the image from the camera, is obtained by~~

- a. acquiring at least two sets of data from the sensor or images from the camera, one with the pointing device object in view of the sensor or the camera and one without, and
- b. comparing the two sets with one another.

15. (Currently Amended) A method according to claim 11 wherein adjustments or modifications are made to the position, viewing angles, sensitivity, and other settings of the sensor or the camera pursuant the analysis of the data or image retrieved from the sensor or the camera.

16. (Currently Amended) A method according to claim 11 wherein at least part of the procedures for the method is carried out using at least in part the computing mechanisms available on one or more of the following: the display, or the sensor or the camera, or the pointing device, or the device producing the signal shown on the display, or the device producing the pointing icon on the display.

17. (Currently Amended) A method for establishing a mapping between the set of positions that a pointing device object can assume in addressing a set of corresponding points or regions on the display comprising the steps of:

a. defining the range of positions that the pointing device can assume, boundaries of the positions that the pointing object can assume in addressing points or regions on the display and defining, within the said boundaries, a continuous pointing object surface.

b. defining the boundaries of the positions that the pointing device can assume so that a virtual display space comprising (i) a continuous one-dimensional line, or (ii) a continuous two-dimensional plane, or (iii) a continuous three-dimensional volume is defined display and defining within the boundaries of the display, a continuous pointing object surface,

c. defining the boundaries of segmenting the display so that a real display space comprising (i) a continuous one-dimensional line, or (ii) a continuous two-dimensional plane, or (iii) a continuous three-dimensional volume is defined, and surface into at least two regions,

d. warping the geometry of the real display space so that the real display space fits optimally within the boundaries of the virtual display space segmenting the pointing object surface into at least two regions,

e. warping the geometry of the surface for the pointing object so that at least one region of the pointing object surface overlaps with at least one region of the display surface, and

f. establishing a one-to-one or many to one correspondence between overlapping the regions of the pointing object surface and the display surface, respectively.

18. (Currently Amended) A method according to claim 17 wherein the boundaries of the set of positions that the pointing device object can assume are obtained by querying the user to point to the boundaries.

Date April 7, 2004

Reply to Office Action dated January 7, 2004

19. (Currently Amended) A method according to claim 17 wherein the boundaries of the set of positions that the pointing device object can assume are obtained by contours or the periphery of the display surface as the display surface is viewed present in the image from by the sensor or the camera.

20. (Currently Amended) A method according to claim 17 wherein at least one special display image is used for establishing the mapping between the set of positions that the pointing device can assume in addressing a set of corresponding points the regions of the display surface comprise at least two sets of pixel elements that comprise the image on the display.

21. (Currently Amended) A method according to claim 17 wherein at least part of the procedures for the method is carried out using at least in part the computing mechanisms available on one or more of the following: the display, or the sensor or camera, or the pointing device object, or the device producing the signal shown on the display, or the device producing the pointing icon on the display.

Cancel claims 22 - 28.

29. (New) A method for establishing a mapping between the regions of a display and an image of the same display obtained from a camera comprising the steps of:

B2

- a. defining the boundaries of the display image,
- b. defining within the boundaries of the display image, a continuous display surface,
- c. segmenting the display surface into at least two regions,
- d. segmenting the display into at least two regions,
- e. warping the geometry of the display image surface so that at least one region of the display image surface overlaps with at least one region of the display surface, and

f. establishing a one-to-one or many to one correspondence between overlapping the regions of the display image surface and the display surface, respectively.

31

30. (New) A method according to claim 29 wherein at least one special image is rendered on the display for establishing a mapping between the regions of a display and an image of the same display obtained from a camera.
